Depth in ft (m) of Tazlina Lake

Unconsolidated deposits This report describes and maps an area of 4,325 mi² (11,279 km²) along the Glenn Unconsolidated deposits of Quaternary age form a mantle that is a few inches em) to more than 500 ft (152 m) thick, as shown on the cross sections (sheet 2). These Highway transportation corridor connecting Anchorage with the conterminous states via Canada. It is between Mileposts 100 and 170 (161 and 274 km) east of Anchorage and 16 to 86 miles (26 to 138 km) west of Glennallen. The purpose of this report is to provide deposits were formed during repeated Quaternary glaciations, mostly during the last major advance of the ice northward from the Chugach Mountains and as valley glaciers moving down Caribou Creek, Oshetna, Little Oshetna, and Little Nelchina Rivers in the information at a reconnaissance scale that can be used in regional planning; laying out preliminary highway routes, locating sites for construction materials, airfields, and other Talkeetna Mountains. In the Copper River Basin, the glaciers advanced into a large facilities; providing information useful in land selection and evaluation of the public and glacial lake formed by ice dams in the Susitna, Copper, and other higher outlets to the native lands; and assisting individuals in selecting lands that have desirable foundation basin (Ferrians and Schmoll, 1957; Alaska Glacial Map Committee, 1965; Nichols and conditions, easily available materials, and a source of water. The report does not Yehle, 1969; Williams and Johnson, 1980, 1981; Ferrians and others, 1983; Williams, supplant the need for the usual site engineering studies and foundation evaluations, 1984). During the maximum advance of the last major glaciation, the lake may have especially in areas of ice-rich permafrost. reached an elevation of 3,200 ft (975 m), because the glacial deposits up to that level are covered with lake silt north of a northeast-southwest line through the south end of Lake The work on which the surficial-deposits studies were based was done by the U.S. Louise. As the ice retreated southward, it was followed by successively lower lake Geological Survey in 1952-1954 and in 1957 in cooperation with the Engineer Intelligence levels, the most prominent of which was about 2,450 ft (747 m) above sea level as Division, Office of the Chief of Engineers, U.S. Army, in 1978-79 under the Geological Survey's Alaska Mineral Resources Assessment Program of the Valdez 1:250,000 quadrangle (Williams and Johnson, 1980, 1981); and in 1980 under its Arctic recorded in wave-cut cliffs and beaches (Williams, 1984) mostly south of Lake Louise; the bottom deposits of this and slightly lower lakes extend up Tazlina and Nelchina River valleys to within a few miles of the present glaciers. Similarly, in the Matanuska River drainage (Williams and Ferrians, 1961, p. 84), glacial lakes were formed upstream from Environmental Studies Program which includes several similar transportation-corridor studies in Alaska. Bedrock information was taken from published and unpublished Matanuska Glacier. Canyon cutting by present streams exposing the glacial and glaciolacustrine deposits in the Matanuska River valley and in the Copper River Basin sources, chiefly industry (Alaska Geological Society, 1970); U.S. Geological Survey mapping of the Mesozoic section in the Nelchina area (Grantz, 1960; 1961a, b; 1965); and the U.S. Geological Survey and Alaska Division of Geological and Geophysical Surveys (cross section B-B') has taken place over the last 10,000 yrs, or perhaps even longer. The lacustrine environment that followed melting of the glaciers has produced a glaciated terrain mantled by thin to thick lake sediments (Williams and Johnson, 1980); on the map preliminary reports on the northern Chugach Mountains (MacKevett and Plafker, 1974; Pessel and others, 1981; Winkler, Silberman, and others, 1981; Burns, 1982; Burns and the materials underlying the lake sediments are identified where their character could be others, 1983) and unpublished mapping by Winkler (written communication, 1984). observed directly or inferred from the landforms or from natural exposures. Mineral resources This segment of the Glenn Highway transportation corridor includes that part of the upper Matanuska River valley upstream from the Matanuska Glacier and the southwestern part of the Copper River Basin, as well as a 5 to 15-mi (8 to 24-km) strip of The principal metallic minerals are gold, chromite, pyrrhotite, sphalerite, galena, and pyrite. At least 225 gold-placer and lode claims were staked during a small gold rush the southeastern Talkeetna Mountains and the northernmost 17 to 30 mi (27 to 48 km) of the Chugach Mountains. The Matanuska River drains to Cook Inlet of the Pacific Ocean, in early 1980 in the Nelchina River area, in the mountains to the east and west, and even along Tazlina Lake. Very little activity was noted in June 1980. Besides the gold, as does that part of the Copper River Basin within the Susitna River drainage basin (Tyone Creek and Tyone River, which includes Lakes Louise, Susitna, and Tyone). The disseminated pyrite and chalcopyrite are common in the volcanic rocks at Sheep balance of the area in the Mendeltna, Tolsona, Nelchina, Tazlina, and Klutina basins Mountain and in the front ranges of the Chugach Mountains from Matanuska Glacier drains via the Copper River through the Chugach Mountains to the Pacific Ocean. eastward nearly to Nelchina River. The copper prospects at East End Creek on Sheep Among the larger lakes are Tazlina Lake, nearly 60 sq mi (155 km²) and locally more than 368 ft (112 m) deep, St. Anne Lake, and Lakes Louise, Susitna, and Tyone. Mountain include barite, chalcocite, chalcopyrite, malachite, and pyrite (Martin and Mertie, 1914, p. 282). Veins containing pyrite, chalcopyrite, galena, and sphalerite occur in igneous rocks one mi (1.6 km) south of the western part of the terminus of Nelchina Glacier. Claims staked by P. C. Barnette east of Nelchina River, probably in the vicinity The eastern part of the area is a flat lacustrine plain broken by river canyons as deep as 500 ft (152 m). Westward and southward the relief increases noticeably on of Barnette Creek, had chromite, pyrrhotite, and pyrite. Porphyritic dikes cut by moraine-capped Tolsona and Tazlina Mountains, on Slide Mountain which stands more pyritiferous quartz veins at the contact between volcanic and sedimentary rocks along than 1,000 ft (305 m) above adjacent lowlands, and in mountain foothills where relief is the front of the Chugach Mountains reportedly (Winkler, Miller, and others, 1981; as much as 1,500 ft (457 m). In the mountains the relief is generally 1,500 to 4,000 ft Winkler, Silberman, and others, 1981; Miller and others, 1982) contained molybdenum, (457 to 1,219 m). Treeline is about 3,500 ft (1,067 m) above sea level, and the sparse copper, and zinc at the west end of Heavenly Ridge—a location where a 1922 assay of the pyrite is said (L. L. Pennington, oral communication, 1952) to have contained \$4-\$20 of spruce forest below that elevation has been affected by frost action, fire, poor soils, wind, and solar exposure, so that the best spruce timber is located on well-drained gravel gold per ton at then-prevailing prices. In 1980 gold was being mined or was being sought and sand of the floodplains and terraces and at a few other well drained sites that have from placers on Yacko Creek, on Tyone Creek at and below the confluence of Red Fox been protected from fire. The great soil groups (identified by Joe Kubota, U.S. Creek, and on Albert Creek, the site of the 1912 discovery that led to the first rush to Department of Agriculture, unpublished mapping, 1952) are generally Podzols at wellthe region. These placers and other similar prospects such as those on Daisy Creek drained sites below timber line and Subarctic Brown Forest soils in the warmer, well-(Chapin, 1915, 1918; Martin and Mertie, 1914), apparently have been formed by reconcentration of gold contained in the Tertiary sandstone and conglomerate by glacial, silt-charged streams (Martin and Mertie, 1914, p. 278, 281; Grantz, 1956). Pan drained sites at lower elevations. These soil groups are interspersed with Bog or Half Bog soils in the wetter areas, Alluvial soils along streams, and Regosols and Arctic concentrates collected from the Tertiary sediments contained gold not only in the Tundra soils above timber line. The growing season over most of the area above 3,000 ft Talkeetna Mountains but also on Slide Mountain and other locations in the Copper river (914 m) is too short for most crops, and, below that elevation, it is marginal. Drought conditions in summer may require irrigation; total rain and snowfall is less than 15 in (38 Basin (O. J. Ferrians, Jr., oral communication, 1983). cm) at Gulkana to the east of the map area and less than 20 in (51 cm) at Eureka Lodge Nonmetallic minerals include sand and gravel, the principal present-day mineral where summer fog and showers are more frequent in a transitional environment to the product of the region in both volume and value, and also undeveloped deposits of clay, gypsiferous rock, limestone, dimension stone, riprap, abrasive material, and mordenite. even wetter or snowier mountain climate. In addition to strong winds associated with passage of storm fronts, very strong foehn winds blow toward the north down the Nelchina, Tazlina and other valleys in the Chugach Mountains when atmospheric pressure Sand and gravel are mined from pits along the Glenn Highway and Lake Louise Road, and potential deposits are located on the map as units al, at, ke, b, f, and s, which are described in the table on sheet 2. Clay deposits are largely included in map unit le, as shown on the map and in the table on sheet 2; these are suitable for brick clay where The climate throughout the area is favorable for generation of permafrost, which thick, relatively free of stones, highly plastic, as, for example, along Tolsona Creek near is distributed discontinuously over most of the area, except in ground that is warmed by Glenn Highway and along Nelchina River upstream from Little Nelchina River. Clay favorable exposure or by convective or conductive heat transfer from water bodies or from weathered volcanic rock (unit Vu) on Sheep Mountain has been used for manufacture ground water. Much of the permafrost in fine-grained deposits contains excess ice as of fire brick (Eckhart, 1953). At the same location Eckhart described six deposits of lenses, veins, and small masses. Thawing of permafrost containing excess ice causes gypsiferous rock containing on the average of 25-30% percent gypsum, the remainder being quartz, alunite, clay, sericite, pyrite, and included masses of altered volcanic rock. Indicated reserves of gypsiferous rock are 310,800 short tons (about 282,000 metric tons); inferred reserves are 348,000 short tons (about 315,700 metric tons) (Eckhart, 1953). Quality of the white limestone (unit SI) in the Little Nelchina region is believed to The bedrock, shown in summary form on the sketch map below, as well as by the lithologic units on the 1:125,000-scale map, is largely of Mesozoic and Cenozoic age. The Chugach Mountains are formed of east-west trending belts of rocks. The be good, although untested. Suitability of the other rock units, the distribution of which is shown on the map and the description of which is tabulated on sheet 2, depends largely on the degree of alteration, texture, and local fracture system of the rock. Because no southernmost belt, the upper Cretaceous Valdez Group, is separated by the Border special study was made of the properties of the various rock units, about all that can be Ranges and Iceberg faults (Winkler, Silberman, and others, 1981) from a melange and a said is that the graywacke, unaltered granite, quartz diorite, gabbro, and some of the complicated array of quartz diorite to gabbro to ultramafic intrusive rocks all of Jurassic age. These rocks are bordered along the northern front of the Chugach Mountains by the volcanic rocks probably would make good riprap, good sources of crushed stone, and, where jointing is favorable, good dimension stone. Other rocks, like the weak shale, lower Jurassic Talkeetna Formation, chiefly volcanic rocks, which also form the siltstone, and some sandstone, and the altered or sheared volcanic rocks and igneous rock basement rock beneath the middle to upper Jurassic and Cretaceous marine and the Tertiary terrestrial sedimentary rocks of the Copper River Basin (fig. A-A', sheet 2) may all be poorly suited for these uses. A deposit of ashy sand or volcanic ash is well exposed in 50-ft (15.2-m) high banks along White Sand Creek, over the divide at the head (Alaska Geological Society, 1970) and of the eastern Talkeetna Mountains (Andreasen and of the creek and at several places west of Tyone Creek within two mi (3.2 km) of the others, 1964; Grantz, 1965). Tertiary nonmarine sandstone and conglomerate is the uppermost bedrock formation throughout most of the eastern Talkeetna Mountains and large exposures. It was mined by Alaska Abrasives Inc. up to 1957 and was used under the product name, Alaskasite, by the military for bluing guns and cleaning metal (J. D. Richardson, company president, oral commun., 1957). Perhaps the largest deposit of Copper River Basin part of the map area. It is as much as 2,000 ft (610 m) thick (section A-A'). It either has been blockfaulted after deposition or has been deposited on an ial-grade mordenite in North America forms a body about 100 ft (30 m) thick erosion surface of high relief because the elevation of the base of the formation and its and 9 mi (14 km) long in the Horn Mountains (unit Vpt) where it is 50 percent mordenite thickness vary widely through the area of outcrop, mostly north of the Glenn Highway. (Hawkins, 1973; 1976a, b). Mordenite is an abrasion-resistant zeolite mineral that is used Lower Jurassic basement rocks become more shallow northward (section A-A') and are locally exposed along the northern boundary of the area. In the Matanuska River valley, as a sorbent for sulfur dioxide. the largely volcanic rocks of the Talkeetna Formation are exposed on the north side of the valley and in horsts between splays of the Castle Mountain fault and its strand, the Caribou fault; marine sediments of upper Cretaceous age, and terrestrial deposits of Fuels consist of oil, gas, coal or lignite, peat and wood. Exploration by several oil Tertiary age exposed in the valley have been cut by numerous faults, apparently related to the Border Ranges and Eagle River thrust faults, and have been cut by numerous small companies between 1953 and 1970 resulted in six test holes in the area (plotted on map and in section A-A'), and others less than a mile (1.6 km) northeast of the area and along Glenn Highway within seven mi (11.3 km) of the eastern boundary of the area. The cross intrusive bodies of Mesozoic and Tertiary age (Detterman and others, 1976; Silberman and Grantz, 1984). The lithologic units shown on the map at a scale of 1:125,000 have section (A-A'), based on logs of these test holes, was modified from one prepared by been generalized from mapping of these complex bedrock units at scales of 1:25,000, Alaska Geological Society (1970); as far as is known, no commercial quantities of oil or 1:63,360, and 1:250,000, as given in the description of bedrock map units. gas were discovered. At least one hole yielded methane and salt water under pressure, suggesting that one of the bedrock formations, perhaps that of lower Cretaceous age, is the ultimate source of the saline ground water in unconsolidated deposits in the central part of the Copper River Basin (Grantz and others, 1962; Williams, 1970; Reitsema, 1979). The saline water is discharged chiefly from springs along Tazlina River and in an and Yehle, 1961), but two small seepages are located between Moose Lake and Tolsona Lake within the map area. Coal occurs very sparingly in upper Cretaceous sandstone along Nelchina River and elsewhere and slightly more commonly in Tertiary sandstone and conglomerate near Atlasta House where prospecting has exposed beds as much as 2 ft (0.6 m) thick and at Lake Louise where coal 5 ft thick (1.5 m) was recorded in a drill hole on the south shore of the lake and where it is exposed as thin slabs in tilted stratified gravel. As far as is known, no deposits of coal or lignite are located near enough to the surface or are thick enough and continuous enough to be of commercial value. No peat deposits large enough to be worked commercially are known. Wood is the chief fuel used by local residents. The largest trees including those of saw quality grow along the streams and on well drained gravelly deposits, such as those of units \underline{al} and \underline{at} . Elsewhere the stunted spruce and the deciduous cover grows in a mosaic pattern that reflects the distribution of poorly drained soils and the history of forest fires. Most of this small spruce timber is less than 4 in (10 cm) in diameter and can be used for firewood. Generalized bedrock geologic map showing major faults Diagrammatic sketch map of major bedrock map units and faults that bound them, particularly the Border Ranges fault and its splays, Klutina, Iceberg, and Tazlina faults, and the Castle Mountain fault and its splay the Caribou fault. Active fault segments are known only in northwest corner of map area and on Border Rangés fault a Map-area location few miles east of Matanuska Glacier. Map units, Q, Quaternary deposits; Tc, Tertiary continental deposits; Ti, Tertiary intrusive rocks; K, marine sediments of upper Cretaceous (Matanuska Formation) age and Nelchina limestone; uJ, marine sediments of middle and upper Jurassic age; IJ marine sediments and volcanic rocks of lower Jurassic Talkeetna Formation; Jg, intermediate granitic and mafic intrusive igneous rocks of Jurassic age; Ju, mafic and ultramafic intrusive igneous rocks of Jurassic age; Mz2, metasedimentary and metavolcanic rocks of McHugh Group, including related igneous rocks and large blocks of this and other formations; Mz₁, graywacke and phyllite of Valdez Group of Cretaceous age, including minor greenstone; CzMz, melange along major faults. Map from Beikman (1974) based on sources cited for bedrock, mapping, and undeted by Wildler Silbermone detected. bedrock mapping, and updated by Winkler, Silberman and others, 1981, and Winkler, unpublished geologic mapping, 1984. Flood-plain and low-terrace alluvium Amphibolite and orthogneis: Alluvial-fan deposits Ground moraine (till) End-and lateral-moraine deposits Debris-rich glacial ice of medial, Index to bedrock geologic mapping Rock-glacier deposits Lava flows and pyroclastic rocks One unit (ic) overlying second unit (gm), SYMBOLS Base: U.S. Geological Survey, compiled from following 1:63,360 quadrangles: Anchorage C-1, C-2, D-1, D-2, D-3, Gulkana A-5, A-6, B-5, B-6, Talkeetna Mountains A-1, B-1, Geology: Bedrock as indicated in credit box beneath description of Valdez C-7, C-8, D-6, D-7, D-8. map units on sheet 2. Surficial deposits mapped by J.R. Williams assisted 1952 by Meyer Rubin, D.U. Wise, 1953-1954 by O.J. Drumlin forms, cross bar near end Sheared and altered rocks of map units toward which glacier was moving. Ib, Ig, Tm TM, and Vu. Ferrians, Jr., 1957 by Livingston Chase, 1978 by K.M. Johnson, 1980 by C.L. Connor, supplemented by field notes and personal communication from Arthur Grantz, L.F. Fay, W.H. Condon, and Richard Hoare, U.S. Geological Survey. Outwash or ice-marginal stream channel; Contact between units: solid where plotted from aerial photographs; arrow in direction of flow. hachured (points downslope) where contact coincides with stream cut scarp; barbed, with barbs downslope, where contact is a 1:125,000 wave-cut shoreline, and dashed or queried where indefinitely located Morainal ridge(s) 15 Well or Exploratory oil well, Shaft fault scarp test boring dry and abandoned Fault scarp along line segment indicating apparent displacement of unconsolidated deposits, as determined from aerial photographs. Number of well, boring, shaft, exploratory oil well, ENGINEERING - GEOLOGIC MAP OF THE SOUTHWESTERN COPPER RIVER BASIN AND UPPER MATANUSKA RIVER VALLEY, ALASKA or shaft listed in table and shown on map and cross section AA'. _____ 913 (95) Boundary of map area